

General Chemistry HW 2

1. Calculate the mass percent of oxygen in ascorbic acid (vitamin C) $C_6H_8O_6$.

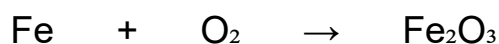
2. A compound composed of carbon, hydrogen, and oxygen was analyzed. When 0.1500 g of this compound was burned with excess oxygen, 0.2200 g of carbon dioxide (CO_2) and 0.0900 g of water (H_2O) were produced.

Assuming all the carbon in the compound is converted to CO_2 and all the hydrogen in the compound is converted to H_2O , determine the mass of carbon and hydrogen originally present in the 0.1500 g sample. Determine the empirical formula of the unknown compound.

3. Balance the following chemical equation:



4. In the unbalanced reaction between 16 moles of iron and 10 moles of oxygen to form iron(III) oxide:



a) What is the limiting reactant?

b) How many moles of Fe_2O_3 will be produced?

5. Three separate cups of water are filled with strong electrolytes, weak electrolytes, and nonelectrolytes. A wire is attached to the liquid and a current is passed through. The bottom of the lightbulb is placed in the water. When a current is run through the wires, which cup will have the brightest bulb and why?

6. Match the following scenarios with their respective reaction types (neutralization, precipitation, combustion, redox):

- Mixing solutions of sodium sulfate and barium chloride, resulting in a white solid forming.
- Using baking soda to neutralize vinegar in a DIY volcano.
- Burning charcoal in a barbecue grill to cook food.
- A battery powering a flashlight.

7. Calculate the number of moles of Cl^- in 1.75 L of $1.0 \times 10^{-3} \text{ M ZnCl}_2$.

8. Blood serum contains about 0.14 M NaCl. What volume of blood contains 1 mg of NaCl?

9. How much 2 M NaCl solution is needed to prepare 250 mL of 0.5 M NaCl solution?

10. A laboratory technician has 100 mL of a 3 M phosphoric acid stock solution and wants to dilute it to 1 L. What will the final molarity of the solution be?

11. Calculate the mass of solid NaCl that must be added to 1.50 L of 0.100 M AgNO_3 solution to precipitate all the Ag^+ ions in the form of AgCl.

12. What volume of 0.150 M H_2SO_4 solution is needed to neutralize 40.0 mL of 0.200 M $\text{Al}(\text{OH})_3$?

13. Determine the oxidation states of each atom in the following molecules:

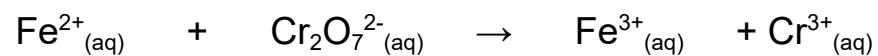
a. HCl

b. CO₂

c. Na₂O

d. Mg(OH)₂

14. Iron(II) ions react with dichromate ions in acidic solution.



a. Identify the oxidizing and reducing agents.

b. Write the balanced oxidation half reaction.

c. Write the balanced reduction half reaction.

d. Write the overall balanced reaction.

15. Zinc reacts with nitrate ions in a basic solution.



a. Identify the oxidizing and reducing agents.

b. Write the balanced oxidation half reaction.

c. Write the balanced reduction half reaction.

d. Write the overall balanced reaction.